FITR

Sea World

Brad Andrews
Vice President
Zoological Operations

November 24, 1993

Mr. Rolland A. Schmitten
Assistant Administrator
for Fisheries
National Marine Fisheries Service
U. S. Department of Commerce
1335 East West Highway, SSMC3
Silver Spring, MD 20910

Dear Mr. Schmitten:

Two copies of the attached serve as an update to our inventory report.

Sincerely,

Brad Andrews

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Vice President
Zoological Operations

cls

Attachment: Marine Mammal Collection/Inventory Report
SWF-Zc-9304 NMFS Inventory Update Report
SWF-Zc-9305 NMFS Inventory Update Report
SWO-Zc-9351 NMFS Inventory Update Report
SWC-Pc-8728 NMFS Inventory Update Report

P2A
Anly
P2P

Sea World, Inc.
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Orlando, FL 32821-8097
(407) 363-2661
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OMB NO. 0648-0084, EXP 7/31/94

SN:	ASN:	LEX:
SP:	ANREP:	FNUM:

FOR NMFS USE ONLY

MARINE MAMMAL COLLECTION/INVENTORY REPORT

TYPE OF REPORT: Inventory Update

NAME OF ANIMAL HOLDER: Sea World, Inc. DATE OF REPORT: 11/24/93

SPECIES SCIENTIFIC NAME: Pseudorca crassidens COMMON NAME: False killer whales

ANIMAL NAME/ IDENTIFICATION	SEX	EST BIRTH YEAR	AUTHOR DOCUMENT	DATE TAKEN OR ACQUIRED	TAKE TYPE	LOCATION OF TAKE PLACE NAME AND LATITUDE-LONGITUDE	COLLECTOR OR SOURCE	CURR STAT	DEATH OR DISPOSITION DATE EXPLANATION	NECRP FILED NMFS
SWC-Pc-8728	F		#504	04/12/87	LM	Japan		D-C	10/08/93	Yes
									Intestinal volvulus	

P2P

SEA WORLD
GROSS NECROPSY REPORT

FACILITY: Sea World of California PROSECTORS: Jim McBain, D.V.M. T. H. Reidarson, D.V.M.

GENUS/SPECIES: Pseudorca crassidens

ID NUMBER: SWC Pc-8728 AGE: adult SEX: female

DATE OF DEATH: 10-8-93 DATE OF NECROPSY: 10-8-93

EXTERNAL MORPHOMETRICS: (metric only)

WEIGHT: 442 kg

TOTAL LENGTH: 358 cm GIRTH AT AXILLA: 150 cm

GIRTH AT ANUS: 106.5 cm FLUKE WIDTH: 75 cm

DORSAL FIN HEIGHT: 28 cm

HISTORY: This animal had no prior history of serious illness. On the morning of October 6, 1993, the animal was reported to be uninterested in food. Within 1 hour, the animal had returned to normal and remained clinically normal until, the morning of October 8, 1993. A blood sample was collected on October 8, 1993, reveal hemoconcentration and significantly elevated liver enzyme and serum iron levels. A hepatopathy of unknown origin was suspected and therapy initiated. The animal lost consciousness while therapy was being administered and died within 30 minutes of losing consciousness.

Code, in parentheses, for samples taken:

C = culture; V - virology; M = metals;
P = pesticides; E = electron microscope samples

GENERAL EXTERNAL APPEARANCE: (oral cavity, external nares, skin, eyes)

Normal.

SUBDERMAL CONDITION: (blubber, muscles, lymph nodes)

Blubber thickness is normal, midventral being approximately 2 cm.

CRANIAL EXAM: (ears, melon, pterygoid sinus) - NVL

CENTRAL NERVOUS SYSTEM: (brain, pituitary, spinal cord) - NVL

THORACIC CAVITY: (pleura) - NVL

UPPER RESPIRATORY SYSTEM: (nasal sacs, nares, larynx) - NVL

LOWER RESPIRATORY SYSTEM: (trachea, bronchi, lungs, lymph nodes)

Trachea contains a moderate amount of pink foam.

CARDIOVASCULAR SYSTEM: (heart, aorta, major vessels) - NVL

ABDOMINAL CAVITY: (lymph nodes)
Abdominal cavity contains approximately 3 liters of serosanguinous fluid. Lymph nodes are grossly normal.

DIGESTIVE SYSTEM: (esophagus, stomach, intestine, rectum, cecum, lymph nodes)
All gastric compartments contain dark red fluid. No ulcerations present. The superficial layers of the mucosa in first gastric compartment are peeling. The small intestine is distended with gas and a dark red fluid. The intestinal wall is thin and dark red especially on the mucosal surface. The mesenteric blood vessels appear engorged. There is a 360° (from the dorsal view) counter clockwise twist of the mesenteric root. There is an irregular transition between the colon and rectum.

LIVER: (biliary system) - NVL

PANCREAS - NVL

SPLEEN: - NVL

REPRODUCTIVE SYSTEM: (testicles, ovaries) - NVL

URINARY SYSTEM: (kidneys, ureter, bladder, urethra) - NVL

ADRENAL GLANDS: - NVL

SKELETAL SYSTEM: - NVL

PARASITE SUMMARY: No parasites found.

SPECIAL TESTS: Microbiology

1. Blood culture:
   no growth

2. Small intestine - fluid
   Enterococcus faecalis
   Plesiomonas shigelloides
   Bacteroides Ureolyticus
   Clostridium perfringens
   Clostridium sordellii

3. Ascitic fluid
   Vibrio damsela
   Clostridium perfringens

GROSS SUMMARY:

1. 360° small intestinal volvulus.

2. Ascites

MICROSCOPIC SUMMARY:

1. Renal congestion.
2. Mesenteric lymph node hemorrhage associated with mesenteric torsion.
3. Mesenteric hemorrhage associated with torsion.
4. Centrolobular hepatic congestion.
5. Small intestinal mucosal necrosis and hemorrhage due to ischemia following mesenteric torsion.
6. Mild multifocal pulmonary hemorrhage.

CONCLUSIONS: (after histology & clinical pathology review)
Death due to toxic shock associated with small intestinal volvulus and infarction.

DATE: 19 Nov '93

SIGNED: [signature] DVM

SIGNED: [signature] DVM

Zoological Pathology Consult
Kent G. Osborn, DVM
Pathology Report

ZPC #: ZPC93001.SWC
Requested by: Dr. Jim McBain
Necropsy Date: 10-8-93
Microscopy Date: 11-16-93

Final Report

ID
Species: Psuedorca crassidens
Common: false killer whale
Strain/Breed: NA
House: SW93067

Sex: female
Age: adult

Diagnoses

spontaneous death due to shock associated with mesenteric root 360 degree torsion, complicated by small intestine ischemia, resulting in probable endotoxic shock

small intestine, hyperemia, thin wall, excess gas and fluid content (sanguinous) due to ischemia following mesenteric torsion (gross diagnosis)

small intestine, mucosa, necrosis, hemorrhage due to ischemia following mesenteric torsion

abdominal cavity, excess fluid, serosanguinous, associated with mesenteric torsion (gross diagnosis)

mesentery, mesenteric lymph node, hemorrhage associated with mesenteric torsion

liver, kidney, congestion, associated with shock following mesenteric torsion

lung, mild mulitfocal hemorrhage

Necropsy Notes

general appearance: This animal is in good weight, with no external lesions.

skin, subcutaneous tissue: The blubber layer is of normal consistency, white and normal thickness (not measured).

thoracic and abdominal cavities: The abdominal cavity contains a moderately large amount of serosanguinous fluid. The small intestines are quite dilated, darkly hyperemic and thin walled. Mesenteric vessels are dilated. These mesenteric and small intestine findings are associated with a 360 degree counterclockwise (from a dorsal orientation) twist of the mesenteric root. No adhesions are present. No lesions are recognized (NLR) in the thoracic cavity.

cardiovascular system: NLR in heart, aorta, cranial mesenteric artery.

respiratory system: Lungs are light red, with scattered, small (≤ 2 cm) pale foci that appear to be areas of trapped air. The trachea and larynx are empty, with NLR.

urogenital system: Kidneys, urinary bladder have NLR. The reproductive tract was saved intact for an investigator and stored before I had a chance to examine it myself, but was not noted to be remarkable.

endocrine system: Pituitary, thyroids and adrenals have NLR.

digestive system: NLR in gingiva, teeth, tongue, esophagus, colon, pancreas and liver. The forestomach is empty except for cloudy thin liquid with multiple pieces of thin translucent material with a reticular pattern of folds that resembles the cobblestone pattern of the mucosa. The fundic stomach, pyloric stomach and duodenal ampulla contain a large amount of thin dark red fluid. The mucosa in these areas is dark red. The small intestine is thin walled and contains a large amount of thin dark red fluid. The small intestine walls are dark red throughout (serosa to mucosa). The colon is empty, but otherwise normal. At the colo-rectal junction there is an irregular, "motheaten" transition between colonic glandular mucosa and rectal nonglandular mucosa. The mucosal color and texture in this area is otherwise normal.

nervous system: The brain has NLR.

immune system: Spleen and tracheobronchial lymph nodes have NLR. The mesenteric lymph nodes are edematous and somewhat hyperemic.

musculoskeletal system: NLR - skull, ribs, vertebral column

Gross Diagnoses

1. spontaneous death due to shock associated with mesenteric root 360 degree torsion, complicated by small intestine

ischemia and necrosis, resulting in metabolic collapse due to hypovolemia, endotoxemia and electrolyte imbalance.

2. small intestine, hyperemia, thin wall, excess gas and fluid content (sanguinous) due to ischemia following mesenteric torsion

3. abdominal cavity, excess fluid, serosanguinous, associated with mesenteric torsion

Microscopic Summary (slide number in parentheses)

The following tissues were examined microscopically and found to be essentially normal: (2) heart, esophagus; (3) lymph node - not otherwise specified (NOS); (4) thoracic aorta; (5) heart; (7) pituitary; (9) heart; (10) heart, mediastinum and large artery; (13) lymph node NOS.

Lesions and/or notable microscopic findings are present in the following tissues:

kidney (1): Sections of several renules have moderate vascular congestion of cortical vessels and glomeruli. renal tubular epithelium contains mild brown course granular cytoplasmic pigmentation. Rare, scattered tubular microliths are present.
Dx: kidney, congestion

pancreas (1): There is a mild/moderate lymphocytic infiltration associated with large intrapancreatic vessels.

mesentery (3): Focal hemorrhage is present, and a small section of mesenteric lymph node is quite congested.
Dx: mesentery, mesenteric lymph node, hemorrhage associated with mesenteric torsion

rectum (4): In the section on slide 4, from the junction of glandular and stratified squamous epithelium, there are several dilated submucosal spaces lined by stratified squamous epithelium and surrounded by variably thick infiltrate of small lymphocytes, with occasional reactive follicular centers. the appearance is suggestive of tonsillar-type tissue. Within one of the spaces there are large numbers of neutrophils. The section on slide 5 is similar to that in slide 4.

colon (4): Colon sections contain a moderate lylmphoplasmacytic infiltrate of the lamina propria, with occasional mucosal/submucosal lymphoid follicles. The follicles generally have reactive centers.

stomach (5,7): The glandular stomach has superficial mucosal congestion.

mesentery and mesenteric lymph node (7,8): The lymph nodes are quite congested, with sinusoidal erythrocytosis/hemorrhage as well. The mesentery contains moderate multifocal hemorrhage.

Dx: mesentery, mesenteric lymph node, hemorrhage associated with mesenteric torsion

adrenal (8): There is mild congestion at the corticomedullary junction.

liver (9): The liver has moderate to marked centrilobular congestion

Dx: liver, centrilobular congestion

small intestine (11): The mucosa and muscularis in this section are severely congested. Superficial mucosa is absent/necrotic. The lamina propria contains mild to severe hemorrhage. Submucosal arteries frequently contain large numbers of neutrophils. Some large submucosal veins contain small thrombi with neutrophils. A space is present between the mucosa and muscularis mucosa, probably due to submucosal edema. There is moderate hemorrhage in the associated mesentery.

Dx: small intestine, mucosa, necrosis, hemorrhage due to ischemia following mesenteric torsion

lung (12,16): Each of the three lung sections here has mild focal hemorrhage.

Dx: lung, mild mulitfocal hemorrhage

mesentery and lymph node (14): The lymph node in this section is normal. the associated mesentery contains moderate hemorrhage.

mesentery and lymph node (15): In this section, the lymph node contains mild diffuse sinus erythrocytosis. No mesenteric hemorrhage is present.

Comment

Gross and microscopic examination reveal an animal that was normal prior to the onset of problems associated with the torsion. Microscopic examination reveals no problems that were unrecognized at necropsy. The major lesion is in the small intestine and mesentery, compatible with torsion and its subsequent secondary effects. Other lesions present (hepatic and renal congestion, mild multifocal pulmonary hemorrhage) are secondary to shock, with the pulmonary hemorrhage likely due to agonal respiration.

Cause of death in this animal is shock, associated with the likely multiple metabolic insults that resulted following the severe mesenteric torsion and subsequent small intestine ischemia. These complications probably included electrolyte imbalance, hypovolemia and endotoxemia in association with the small intestine mucosal necrosis. Cause for this problem in this animal cannot be determined. Such a lesion, also referred to as intestinal volvulus in the literature, is recognized in swine, ruminants[1] and horses[2], and in dogs with exocrine pancreatic insufficiency[3]. Mesenteric torsion has been proposed to be associated with excess intraluminal intestinal gas formation and hypermotility.

Kent G. Osborn, DVM

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[1]. Anderson DE, PD Constable, G St. Jean, BL Hull. Small-intestinal volvulus in cattle: 35 cases (1967-1992). J Am Vet Med Assoc 1993;203:1178-1183.

[2]. Dabareiner RM, JR Snyder, KE Sullins, NA White, I A Gardner. Evaluation of the microcirculation of the equine jejunum and ascending colon after ischemia and reperfusion. Am J Vet Res 1993;54:1683-1692.

[3]. Westermarck E, E Rimaila-Parnanen. Mesenteric torsion in dogs with exocrine pancreatic insufficiency: 21 cases (1978-1987). J Am Vet Med Assoc 1989;195:1404-1406.